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(56) Documents Cited

GB 1449972 A GB 1085356 A US 4892002 A

(58) Field of Search

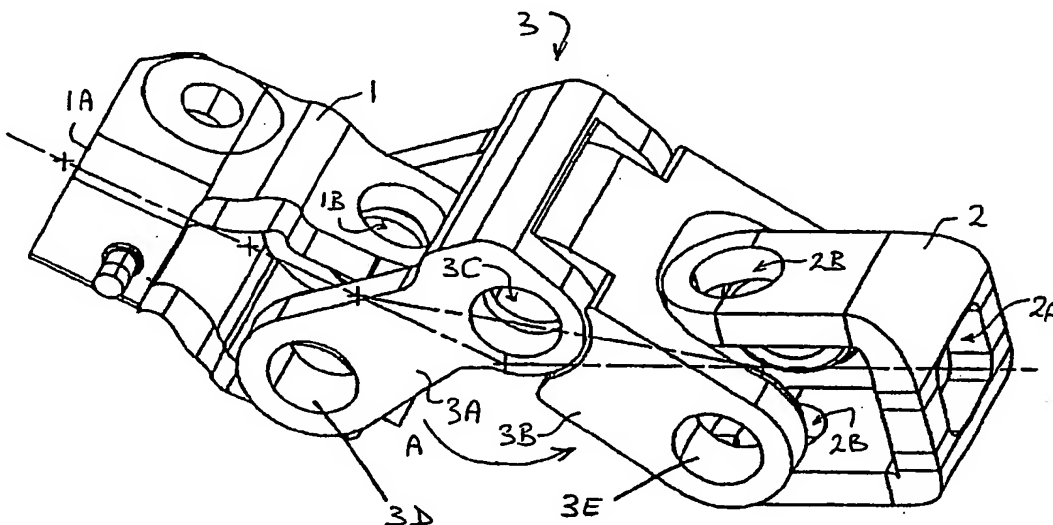
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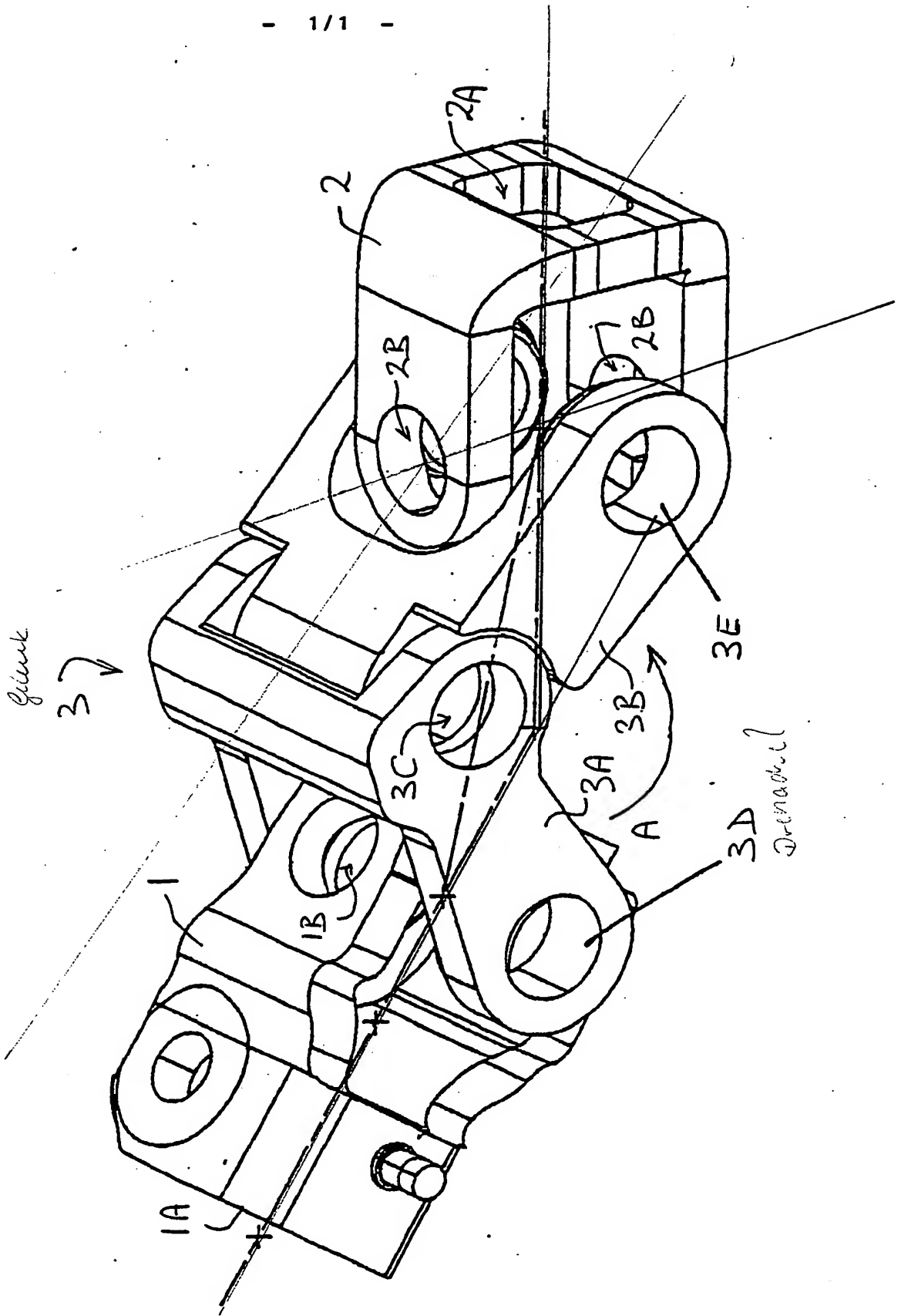
(54) **Shaft coupling for a vehicle steering column**

(57) A shaft coupling, especially for coupling upper and lower shafts of a vehicle steering column, comprises two yokes (1, 2) interconnected through respective cross members by a pivotable elbow member (3), having two limbs (3A, 3B) pivoted together. The outer end of each limb is coupled to a respective one of the cross members and the pivot axes of the elbow member and the cross members mounted on the elbow member are parallel to one another.

The coupling is suitable for a steering column which is rake and/or reach adjustable and allows, upon impact in a crash situation collapse of the coupling so one limb contacts the other in order to transmit collapse effort through the coupling.



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SHAFT COUPLING

This invention relates to a shaft coupling.

5 Hitherto, with rotatable shaft couplings, e.g. for use in vehicle steering columns, there has been a problem of how to obtain satisfactory torque transmission through the coupling if the two ends of the shaft are mounted at an angle to one another.

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Furthermore, it is desirable for the coupling to allow collapse of the two ends of the shaft towards one another in the event of a vehicle crash.

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According to the present invention, there is provided a shaft coupling comprising two yokes interconnected through respective cross members by a pivotable elbow member having two limbs pivoted together, the outer end of each limb being coupled to a respective one of the cross members.

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The invention also extends to a vehicle steering column incorporating a shaft coupling essentially as just defined.

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For a better understanding of the invention and to show how the same may be carried into effect, reference will now be made, by way of example, to the accompanying drawing, in which the single Figure is a perspective view of a shaft coupling.

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Referring to the drawing, the shaft coupling shown omits the shafts themselves for clarity, as well as two cross members, which are well known in the art and which are used to link parts of the coupling together.

The coupling includes two yokes, 1, 2, into which are to be mounted the ends of two shafts (not shown) of a vehicle steering column. One end of one shaft, either the upper end of a lower shaft or the lower end of an upper shaft, is mounted in an aperture 1A of the yoke 1 and the opposite corresponding end of the other shaft is mounted in an aperture 2A of the yoke 2. The yokes 1 and 2 are linked by cross members (not shown), fitted in apertures 1B, 2B, respectively, in the limbs of the yokes, to an elbow member 3.

The elbow member 3 comprises two forked limbs 3A, 3B pivotably mounted together at 3C on a pivot pin (not shown). Respective outer ends of the limbs 3A, 3B, i.e. the forked ends, are mounted on pivot points of the respective cross members at 3D, 3E, on which the yokes 1 and 2 are also mounted.

It will be noted that the pivot axes of the respective crosses on the elbow member 3 are parallel to one another and are also parallel to the common pivot axis of the two limbs 3A, 3B of the elbow member.

The shaft coupling is ideally for use in a steering column which is both rake and reach adjustable and it will be seen that the particular construction of the link member allows for usual angular adjustment of the coupling to allow for alteration in angles as a result of the adjustment of rake and/or reach of the steering wheel on the column.

However, in the event of a vehicle crash, one limb, for example the limb 3A, can be pushed by the lower shaft to pivot so far that the limb 3A will close in on the edge walls of the fork of the limb 3B in the direction of the arrow A. In this condition, crash effort can be transmitted through the shaft

coupling to a vehicle crash impact energy absorbing mechanism. The coupling allows this collapse effort to work through the coupling, whatever the angle of mounting of the lower and/or upper shaft of the vehicle steering column.

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A vibration inhibiting isolator can be provided in the coupling and one way of achieving this is by bonding rubber on the central pivot pin linking the two limbs 3A, 3B. This rubber will also assist in centralising the system.

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The two crosses can incorporate built-in seals.

CLAIMS:

5 1. A shaft coupling comprising two yokes interconnected through respective cross members by a pivotable elbow member having two limbs pivoted together, the outer end of each limb being coupled to a respective one of the cross members.

10 2. A coupling according to claim 1, wherein each limb of said elbow member is forked so as to embrace and engage two pivot ends of a said respective cross member.

15 3. A coupling according to claim 1 or 2, wherein each limb of said elbow member is constructed to allow relative movement between the two limbs as far as closing contact between the side edges of the two limbs.

20 4. A coupling according to claim 1, 2 or 3, wherein the pivot axis of the two limbs and the pivot axes of the cross members on the elbow member are parallel to one another.

25 5. A coupling according to any one of the preceding claims and including rubber bonded on a central pivot pin linking said two limbs, thereby to act as a vibration inhibiting isolator.

6. A shaft coupling, substantially as hereinbefore described with reference to the accompanying drawing.

30 7. A vehicle steering column having upper and lower shafts, said shafts being coupled by a coupling according to any one of the preceding claims.

Relevant Technical Fields

(i) UK Cl (Ed.L) F2U

(ii) Int Cl (Ed.5) F16D 3/26, 3/32, 3/33, 3/34; B62D 1/18, 1/19

Databases (see below)

(i) UK Patent Office collections of GB, EP, WO and US patent specifications.

(ii)

Search Examiner
T S SUTHERLAND

Date of completion of Search
30 DECEMBER 1993

Documents considered relevant
following a search in respect of
Claims :-
1-5,7

Categories of documents

- X: Document indicating lack of novelty or of inventive step. P: Document published on or after the declared priority date but before the filing date of the present application.
- Y: Document indicating lack of inventive step if combined with one or more other documents of the same category. E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.
- A: Document indicating technological background and/or state of the art. &: Member of the same patent family; corresponding document.

Category	Identity of document and relevant passages		Relevant to claim(s)
X	GB 1449972	(UNITED AIRCRAFT) Figures 1 and 2	1,3
X	GB 1085356	(BRD) Figures 1-4	1,2,7
X	US 4892002	(GROAT) Figures 1, 8, pivot pin 22	1,2,7